

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re patent application of

Docket No.: P27191

Douglas D. COOLBAUGH et al.

Confirmation No. 1904

Serial No.: 10/707,905

Group Art Unit: No. 2811

Filed: January 23, 2004

Examiner: Shouxiang Hu

For: **STRUCTURE AND METHOD FOR HYPER-ABRUPT JUNCTION VARACTORS**

**REQUEST FOR PRE-APPEAL BRIEF REVIEW**

Commissioner for Patents  
U.S. Patent and Trademark Office  
Customer Window, Mail Stop AE  
Randolph Building  
401 Dulany Street  
Alexandria, VA 22314  
Sir:

This request is being filed concurrently with a Notice of Appeal and is responsive to the Final Official Action of July 24, 2006.

Reconsideration and withdrawal of the 35 U.S.C. § 112, 1<sup>st</sup> and 2<sup>nd</sup> paragraph rejections, the 35 U.S.C. § 102(b) rejection, and the 35 U.S.C. § 103(a) rejection are respectfully requested in view of the following remarks.

***A prima facie case of the written description requirement and indefiniteness has not been set forth and the Rejections Under 35 U.S.C. § 112, 1<sup>st</sup> and 2<sup>nd</sup> paragraphs are improper.***

***A prima facie case of anticipation has not been set forth and the Rejection Under 35 U.S.C. § 102(b) is improper.***

***A prima facie case of unpatentability has not been set forth and the Rejection Under 35 U.S.C. § 103(a) is improper***

**Examiner's Assertion**

In the Advisory Action of October 2, 2006, the Examiner indicated that the Rule 1.116 Amendment filed on September 25, 2006 would not be entered, but also indicated that "[t]he request for reconsideration has been considered".

**Applicant's Response**

Applicant submits that the Rule 1.116 Amendment of claim 28 should have been

entered because the amendment specifically addressed the Section 112, 1<sup>st</sup> paragraph, rejection. Indeed, the Examiner's basis for this rejection purports to require the very amendment made by Applicant. (See last sentence of this rejection).

**Examiner's Assertion**

The Examiner asserts that claim 28 fails to comply with the written description requirement.

**Applicant's Response**

Applicant respectfully disagrees. The features asserted to be lacking in written description support can be found in paragraph [0049] of the instant specification which specifically states:

As thus described, the active region of the varactor including the cathode, collector, HA junction, and anode is formed by three doping steps. Each of the three doping steps has approximately less energy than the previous doping step in order to deposit its respective dopants at successively shallower depths. Because the active region of the varactor is formed solely by the doping steps, the C-V tuning curve of the resulting varactor is less affected by growing or etching steps, and there is less manufacturing variation from unit to unit. Thus, the resulting varactor is simpler and less expensive to fabricate, and may be manufactured to tighter tolerances.

Applicant directs the Examiner's attention to MPEP 2163 which states:

To satisfy the written description requirement, a patent specification must describe the claimed invention in sufficient detail that one skilled in the art can reasonably conclude that the inventor had possession of the claimed invention (emphasis added).

The Examiner has simply not demonstrated that one skilled in the art cannot reasonably conclude that the inventor had possession of the claimed invention.

**Examiner's Assertion**

The Examiner asserts that claim 28 is indefinite because it does not recite the relationships between the three doping steps.

**Applicant's Response**

Applicant respectfully disagrees. The Examiner has not demonstrated how one having ordinary skill in the art, having read the specification and drawings, would not understand what is claimed in claim 28. Applicant submits that contrary to the Examiner's assertions, Applicant is not required under section 112, 2<sup>nd</sup> paragraph, to limit the invention to any particular cooperative relationship between the recited doping

steps. To the extent that the Examiner relies upon MPEP 2172.01, the Examiner has misread MPEP 2172.01, which indicates that when it is indicated "by applicant" in the specification that certain features are essential to the invention, such features must be recited in the claims. The Examiner has identified no features which were indicated "by Applicant" to be critical and which are not recited in the claims. In any event, claim 16 clearly recites the relationship between the doping steps.

#### **Examiner's Assertion**

The Examiner asserts that independent claims 16, 24 and 29 are anticipated by IGARASHI.

#### **Applicant's Response**

Applicant respectfully disagrees.

Independent claim 16 recites, *inter alia*,

doping a lower region of the semiconductor substrate with a first dopant at a first energy level;

doping a middle region of the semiconductor substrate with a second dopant at a second energy level lower than the first energy level; and

doping an upper region of the semiconductor substrate with a third dopant at a third energy level lower than the second energy level.

Additionally, claim 24 recites, *inter alia*,

that the doping of the middle region has approximately less energy than the doping of the lower region and that the doping of the upper region has approximately less energy than the doping of the middle region.

Finally, claim 29 recites, *inter alia*,

doping a lower region of the semiconductor substrate with a first dopant at a first energy level;

doping a middle region of the semiconductor substrate with a second dopant at a second energy level lower than the first energy level; and

doping an upper region of the semiconductor substrate with a third dopant at a third energy level lower than the second energy level,

wherein the semiconductor substrate includes a collector region and a cathode that are formed in a single doping step via energy distribution of a single dopant type.

Applicant submits that IGARASHI does not disclose, or even suggest, the three recited doping steps, much less, that each of the three doping steps has less energy than the previous doping step. While the Examiner has provided an English language translation of this document, the Examiner has failed to identify the specific language

which discloses each feature recited in the above-noted claims. As such, the Examiner has failed to set forth a *prima facie* case of anticipation. Applicant emphasizes that IGARASHI has not been shown to disclose, or even suggest, the three recited doping steps, much less, that each of the three doping steps has approximately less energy than the previous doping step. Applicant notes, in particular, that paragraphs [0012] and [0013] of the English language translation of IGARASHI disclose two ion implanting steps using different energy levels. Accordingly, the English language translation of IGARASHI clearly does not specifically disclose doping the three recited regions and the recited energy levels, much less: (i) doping a lower region of the semiconductor substrate with a first dopant at a first energy level, doping a middle region of the semiconductor substrate with a second dopant at a second energy level lower than the first energy level, and doping an upper region of the semiconductor substrate with a third dopant at a third energy level lower than the second energy level (claim 16); (ii) that the doping of the middle region has approximately less energy than the doping of the lower region and that the doping of the upper region has approximately less energy than the doping of the middle region (claim 24); (III) doping a lower region of the semiconductor substrate with a first dopant at a first energy level, doping a middle region of the semiconductor substrate with a second dopant at a second energy level lower than the first energy level, and doping an upper region of the semiconductor substrate with a third dopant at a third energy level lower than the second energy level, wherein the semiconductor substrate includes a collector region and a cathode that are formed in a single doping step via energy distribution of a single dopant type (claim 29). These features are clearly not disclosed or suggested in the English language translation of IGARASHI.

#### **Examiner's Assertion**

In rejecting dependent claims 19-23 as obvious over IGARASHI with Applicant's Admitted Prior Art (AAPA), the Examiner acknowledged that IGARASHI fails to disclose or suggest the features of these claims, but noted that the features of claims 19-23 are obvious in view of AAPA because the recited features are asserted to be conventional.

#### **Applicant's Response**

Applicant respectfully disagrees. Although not specifically addressed by the Examiner, in addition to the reasons already made of record, Applicant submits that

AAPA does not disclose, or even suggest, the three recited doping steps of claim 16 (from which these claims depend), much less, that each of the three doping steps has less energy than the previous doping step. Applicant notes, in particular, that the language in the instant specification describing Fig. 1 explains that the subcollector 14 is doped with a 40 KeV energy level, that the collector 16 is doped with a 700 KeV energy level, and that the HA junction 24 is doped with a 40 KeV energy level. Such language is clearly not suggestive of the three doping steps having approximately less energy than the previous doping step, as recited in the claims. Because, as noted above, IGARASHI does not disclose, or even suggest, the three recited doping steps, much less, that each of the three doping steps has less energy than the previous doping step, and because AAPA does not cure these deficiencies, Applicant submit that the Examiner has failed to set forth a *prima facie* case of unpatentability.

Applicant also submits that there is no motivation to modify IGARASHI in view of AAPA or what is asserted to be known in the art in a manner which would render obvious Applicant's invention, and additionally, Applicant submits that there is no motivation or rationale disclosed or suggested in IGARASHI or AAPA to modify IGARASHI in the manner suggested by the Examiner. The Examiner's opinion simply does not provide a proper basis for these features or for the motivation to modify or combine these documents in the manner suggested by the Examiner.

#### CONCLUSION

Reconsideration of the Final Office Action and allowance of the present application and all the claims therein are respectfully requested and now believed to be appropriate.

Respectfully submitted,  
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